

Engl. Bot. t. 32; Fl. Dan. t. 1230; Gray, Syn. Fl. i. part 2, 394; Britton & Brown, Ill. Fl. iii. 483, f. 4054 — MAINE, Mt. Desert Island, *Rand*, and adjacent coast: MASSACHUSETTS, vicinity of Boston, *Wm. Boott* (coll. of Sept., 1879); CAMBRIDGE, *B. L. Robinson* (coll. of 1 Sept., 1897): RHODE ISLAND, near Providence, *J. W. Congdon* (coll. of 4 Sept., 1874); *W. W. Bailey* (coll. of 1876).

+ + Pubescence not glandular.

++ Heads usually with short inconspicuous rays: involucre barely calyculate.

7. *S. SYLVATICUS*, L. Stems erect, 1 to 4 dm. high, simple or branched, usually somewhat pubescent: lower leaves petioled and more or less lyrate, the upper pinnatifid with unequal lobes, sessile, clasping and slightly sagittate, 2 to 15 cm. long, 1 to 8 cm. broad: inflorescence naked or nearly so: heads cylindrical; involucre barely calyculate with few and inconspicuous scales: ligules barely surpassing the disk-flowers (or none?): achenes canescent. — Sp. ii. 868, & ed. 2, 1217; Eng. Bot. t. 748; Fl. Dan. t. 869; Gray, Syn. Fl. i. part 2, 394; Britton & Brown, Ill. Fl. iii. 482, as to description. — MAINE, Mt. Desert Island and Southport, *Fernald*.

++ ++ Heads rayless: involucre conspicuously calyculate with short black-tipped scales.

8. *S. VULGARIS*, L. Stems 1 to 4 dm. high, essentially glabrous, or subfloccose-pubescent especially in the axils of the leaves and in the inflorescence: leaves pinnatifid, more or less lyrate, with angulately toothed divisions, sessile and subclasping, 2 to 8 cm. long: heads discoid: achenes puberulent along the angles. — Sp. ii. 867, & ed. 2, 1216; Fl. Dan. t. 513; Eng. Bot. t. 747; Gray, Syn. Fl. i. part 2, 394; Britton & Brown, Ill. Fl. iii. 482, f. 4053. — MAINE, Blaine, *Fernald* (coll. of 12 Sept., 1896): VERMONT, Rutland, *Eggleston*: MASSACHUSETTS, Ipswich, *Oakes*; Swampscott, *C. A. Weatherby* (coll. of 21 June, 1897); Revere Beach, *Greenman*, no. 515, RHODE ISLAND, Providence, *Thurber* (coll. of 1844): CONNECTICUT: Southington, *Andrews* no. 1.

BERLIN, GERMANY.

## FOSSOMBRONIA SALINA IN CONNECTICUT.

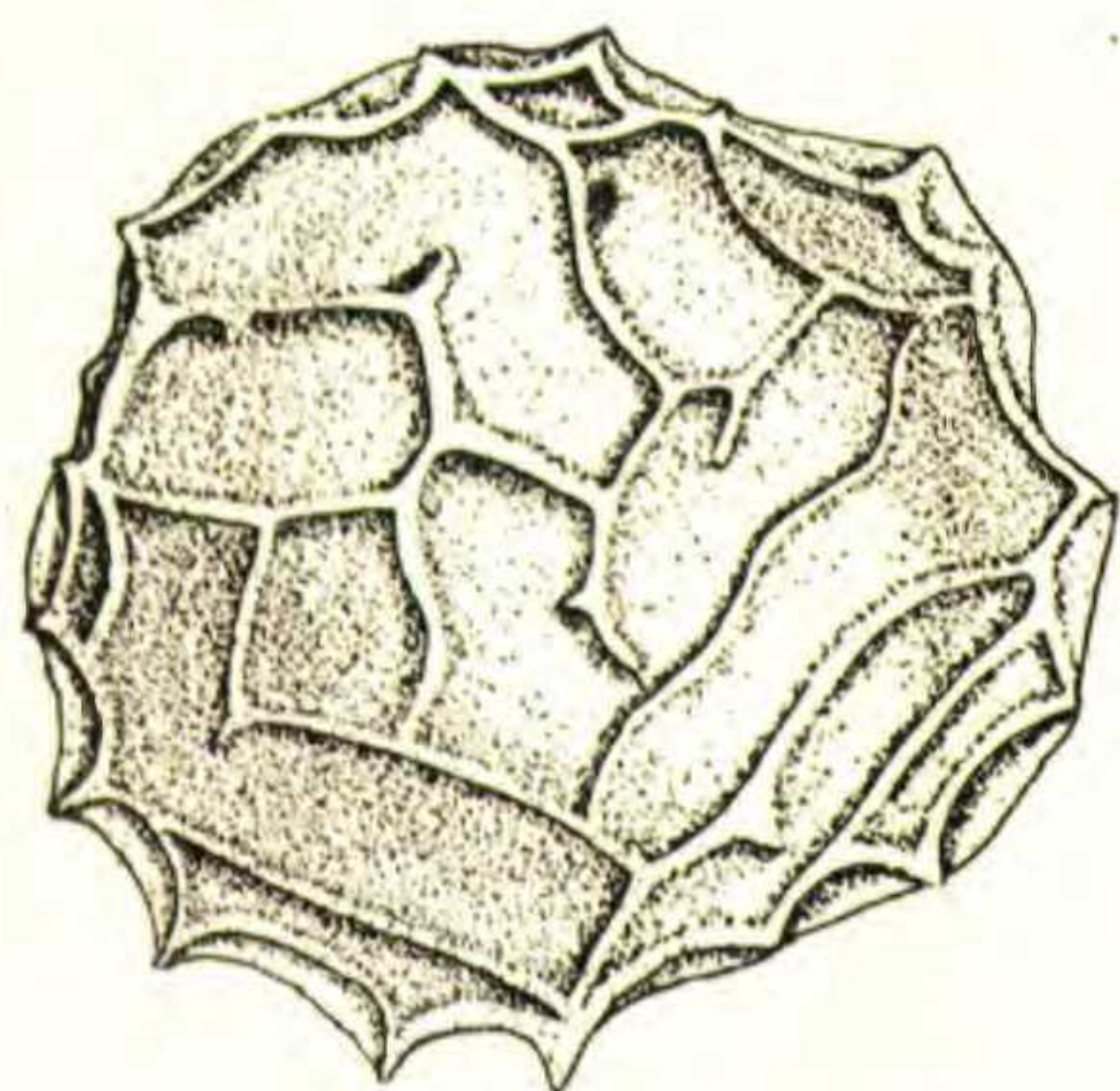
ALEXANDER W. EVANS.

THE various species of *Fossombronia* resemble one another so closely in their vegetative characters, that it is, in most cases, a questionable policy to describe new species from specimens whose capsules



and spores are not fully developed. The history of the present species, which has remained practically unknown for twenty-five years, will serve to emphasize this fact.

In 1872, Austin distributed, as *Fossombronia angulosa* Raddi,<sup>1</sup> a plant which he reported as common in brackish meadows, without giving any more definite indication of the locality where his specimens were found. It is probable, however, that the plants were collected in New Jersey, as they are listed in Britton's Catalogue of New Jersey Plants. In the two sets of Austin's exsiccatae which I have been able to examine, the specimens are quite destitute of mature capsules. Some of the stems, however, show sexual organs, among which are fertilized archegonia. As Austin noted that the plant matured in early spring, it is evident that these specimens were collected in late summer or early autumn before the sporophytes had had time to develop. In 1875, Lindberg,<sup>2</sup> in commenting on Austin's exsiccatae, asserts that these specimens do not agree with the true *Fossombronia angulosa* of Europe, but differ from it in being paroicous instead of dioicous. Although no other difference is mentioned, the specimens in Lindberg's set also being apparently without capsules, they are designated as *Fossombronia salina* n. sp. Since this time nothing new has been written about this imperfectly described plant, although attention is called to it by both Underwood<sup>3</sup> and Stephani,<sup>4</sup> who place it among the doubtful members of the genus.



Spore of *Fossombronia salina*  $\times 730$ .

A number of years ago, in August, the writer collected a large *Fossombronia* in a swamp in East Haven, Connecticut, perhaps half a mile from the salt water. The specimens were without capsules but showed well developed antheridia and archegonia on the same stem. Several years afterward upon visiting the locality late in May, numerous plants were found with somewhat immature capsules. These developed readily upon being brought into the laboratory and soon showed fully ripened spores. These specimens agree

with Austin's in their large size, in their monoicous inflorescence and

<sup>1</sup> Hep. Bor.-Amer. no. 119.

<sup>2</sup> Acta Soc. Sci. Fenn. 10: 533.

<sup>3</sup> Bot. Gazette, 21: 70. 1896.

<sup>4</sup> Mem. de l'Herb. Boissier, 16: 40. 1900.



in the season of the year in which they mature their spores. They agree also in the unsatisfactory characters drawn from the vegetative structure of the gametophyte, such as the outline of the stem-section, the shape of the leaves and the average size of the leaf-cells. Although these points of resemblance are not all that we might desire in the present genus, they seem sufficient to justify us in referring these East Haven specimens to Austin's *F. angulosa* and hence to Lindberg's *F. salina*.

Closely agreeing with the Connecticut plants and apparently referable to the same species, are the specimens from Florida, distributed by Underwood and Cook as *F. angulosa*.<sup>1</sup> These specimens, which were collected in March, are a little past maturity. They seem to have lost all signs of antheridia but show characteristic spores. Through the kindness of Professor Underwood, I have had the privilege of examining younger specimens of the same plant collected in January. On some of these, the capsules are just maturing, but there are also young branches present which exhibit both antheridia and archegonia, showing that the inflorescence is monoicous. It would appear as if the season for the ripening of the spores were a little less definite in Florida than farther north, but this might easily be accounted for by the differences in climate.

Although *Fossombronia salina* is known from so few localities, it will probably be found at intermediate stations along the Atlantic coast. The following description, drawn from spore-bearing material, will aid in its recognition :

FOSSOMBRONIA SALINA Lindb. Acta Soc. Sci. Fenn. 10: 533. 1875.

*F. angulosa* Aust. Hep. Bor.-Amer. no. 119. 1872 (not Raddi).

Heteroicous: scattered or caespitose, dark green becoming paler or brownish with age: stems dichotomous, 1 cm. or more long, 0.3 mm. in diameter and about 10 cells thick, prostrate, closely adherent to the soil by means of numerous deep purple rhizoids, upper surface plane or slightly convex, lower surface strongly convex or carinate: leaves more or less imbricated except on attenuate axes, 1-1.3 mm. long, more variable in width, 1 cell thick except at the very base, quadrate-oblong from a broad, slightly decurrent base, apex broad, indistinctly lobed and crispate, the lobes very variable, mostly rounded but sometimes apiculate or acute: leaf-cells very variable in size, averaging  $37 \times 28 \mu$  on edge of leaf,  $60 \times 30 \mu$  in the middle and  $70 \mu$  at the base: pseudoperianth about 1.5 mm. high, turbinate, slightly and irregularly sinuate-lobed and

<sup>1</sup> Hep. Amer. no. 118.



crispate at the mouth, the lobes rounded, entire: capsule borne on a short stalk; spores  $41-48\ \mu$  in diameter, brown, in some cases regularly reticulate with  $11-13$  polygonal meshes on convex face, usually irregularly furcate-lamellate without distinct meshes; lamellae low and thin, deeply pigmented in lower part and in the regions of anastomosis, often paler on the edges, projecting slightly on the margins of the spore as short, often indistinct points; elaters very irregular, with 2 or 3 spirals.

East Haven, Connecticut (Evans). New Jersey (Austin). Eustis, Florida (Underwood).

*Fossombronia salina* differs from *F. angulosa* in its inflorescence and in its leaf-cells, which are not markedly elongated at the base of the leaf. The spores of the European species also are a little smaller, they are very regularly reticulate with fewer meshes (mostly 7 to 10 on the convex face of the spore), the lamellae are higher and thinner, and their pale free margins are very distinct, appearing as a translucent wing on the margin of the spore.

Of the two other species of *Fossombronia* which have been found in New England, the common *F. foveolata* Lindb. (*F. Dumortieri* Lindb.) bears the most resemblance to *F. salina*. This species, however, is smaller and is an annual, developing its sexual organs in the summer and its capsules in the autumn of the same year. Its spores are very like those of *F. salina* and are of about the same size, but they tend to be more regularly reticulate, and the meshes of the reticulum are smaller and more numerous (usually numbering from 15 to 20 on the convex face of the spore). The much rarer *F. Wondraczekii* (Corda) Dumort. (*F. cristata* Lindb.), now known from both New Hampshire and Connecticut, is also an annual plant, similar in general appearance to *F. foveolata*. Its spores are a little smaller than those of *F. salina* and have very different markings; their lamellae, which are much finer and more numerous, tend to be parallel as seen from one side of the spore but anastomose somewhat in the middle of the convex face, often forming a few irregular meshes in this region.

YALE UNIVERSITY.